

**Recommended
Time: 60-75 min.**

Determine Relative Risks of Natural Hazards

The Importance of Determining the Relative Risks of Potential Natural Disasters in Your Area

Because the amount of money available for assisting targeted homeowners is limited, it is critical to put those funds to the best use. Therefore, you need to assess first what are the greatest potential risks with the most severe consequences for your area and then the greatest potential risks for each home that will be inspected.

Although your area may be at risk for all four kinds of disasters: flood, wind, earthquake and fire, the possibility of the occurrence of one kind of disaster may be greater than for another. The consequences associated with each may also vary. Maps from FEMA and other sources are available to show the risks of each kind of disaster. Because some risk maps are general and use national data, you also need to focus as much as possible on the information available for your locality. For example, the national Wind Zone Map uses data for 1000 square miles, but Flood Insurance Rate Maps (FIRM) which show specific roads, tributaries and creeks are available for most localities.

To determine the relative risks of the various kinds of natural disasters, start by looking at maps that show the risk of each disaster to your area. In general, the darker the shading on the maps we are using for flood, wind, and fire, the greater the risk.

30-45 minutes

How to Determine Flood Risk using a Flood Insurance Rate Map

Because flooding is the most common disaster in the United States, is so disruptive to the lives of those affected, and repairs are so expensive both to those directly affected and the taxpayers, it is a major national concern. In fact, on an annual basis, floods cause ninety percent of all property losses from natural disasters in the United States. To enable homeowners to assess and manage their flood risks, FEMA has prepared detailed Flood Insurance Rate Maps (FIRMs) for many areas of the country. The agency has also instituted the National Flood Insurance Program which can speed homeowners' recovery from flooding by making insurance coverage available at very favorable rates. You can order FIRMs from FEMA or contact the local community's map repository. The map repository is usually located in the local City engineers or planners office. FEMA also provides a guide about how to use a FIRM.

Go to the back of the manual to a plastic pouch holding *How to Use a Flood Map To Determine Flood Risk For a Property*.

Lead the class through a review of the booklet and focus on key information on the left.

Pages for attention:

Inside cover: Message from the Director

P. 1: Table of Contents

P. 2: "National Flood Insurance Program"

Its purposes include reducing losses and discouraging unwise development and providing the public the opportunity to buy flood insurance from agents at private insurance companies. The program also encourages using sound building techniques to reduce potential future damage.

"What You Will Find on Flood Maps"

Middle column:

- Discussion of a 100-year flood

A 100-year flood means that for any year, the risk of a flood reaching or exceeding this level is 1%.

In practice, a 100-year flood means that in every year, the resident's risk of that level of flooding is the same.

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This level of risk does **not** mean that because a flood reached that point last year that the area is safe for the next 99 years, although that is what many residents think it means.

Therefore, before their home is actually flooded, many residents think they do not need to buy flood insurance. However, flood insurance is a cost-effective means of mitigating flood risk and is underwritten by the Federal government. Homeowners can purchase flood insurance by contacting their insurance agent or FEMA.

- Definition of Base Flood Elevation (BFE)
Base Flood Elevation refers to the predicted water level for the 100-year flood.

Column 3:

“What Flood Maps Can Help You Do”

“How to Obtain Flood Maps”

P. 4: Col. 1:

Paragraph 2 – Flood Maps are produced at different scales and cover different sized areas, i.e., entire counties, etc. or just parts of them. “Two Basic Formats”: Flat and Z-fold; “The Legend/Key to Map”

Column 2:

“The Index”

“The Panel”

“The Legend/Key to Map”

Column 3:

“The Title Box”

P. 5-6: “How To Read the Flood Map Index”

P. 7: Look at the examples.

P. 8: Col. 1: “Found on All Panels...”

Base (100-Year) Flood Elevation Line and Label:

A wavy line is used when the elevation varies along a watercourse. A label indicates the elevation is uniform across a large area. The elevation is usually expressed in feet, but may be in meters. (The default is in feet.)

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Col. 2, middle section:

Coastal Barrier Symbol

Note: For newer Z-fold Flood Maps, Zone X can be tinted or untinted. P. 13 and 14 explain that when shaded, Zone X indicates areas subject to a 500-year flood and a 100-year flood with depths up to one foot or a protected area. Untinted means the risk for that area is undetermined, and it is outside the 500-year floodplain.

P. 14:

Note states that this map “does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.”

Verify Understanding

P. 9:

Maps

Note differences between lighter and darker tinting.

On this page the difference is clear; however, when you have only one map with consistent shading, the difference may be less apparent.

Ask:

1. What does darker shading indicate?
2. On the top map, what do the numbers in the middle of the blocks mean?

P. 10-11:

- Determine what various useful map markings indicate by referring to the information on P. 12-14.

Note:

P. 14 The Legend is most comprehensive

P. 12 has definitions; there are more in the Glossary on P. 21.

P. 13 has more detail about what the codes indicate about the flood areas. Some of that information is also on P. 14.

- Although Zones C and X unshaded are outside the 500-year floodplain, the hazard beyond the 500 years is undetermined, so there is still potential hazard of flooding.

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The instructor should note that the FIRM shows the hazard due to flooding and the elevation of the 100-year flood. However, the depth of flooding in the structure determines the risk at an individual structure.

- Similarly, Zone D, which is unshaded, has undetermined flood hazards.
- Because the FIRMs do not show the contours of the land, you must look at the site where the home is located to assess its risk.

For example, if the land just outside the marked floodplain area is flat, the overflow water from a flood could easily flow to the site. However, if the home is situated on a rise, its risk is lowered.

Identify on P. 10-11:

3. The meaning of the numbers “8, 9, and 10” beside the wavy lines
4. The areas:
 - A. Of greatest hazard
 - B. Of less hazard
 - C. Of minimal hazard
 - D. Of unknown hazard
5. The meaning of the hatched lines in the Hackberry Draw and the consequences for a resident whose home is there
6. The hazard to Zone X areas at the top left which are untinted vs. those also in Zone X which are tinted
7. A Coastal Barrier area
8. The hazard associated with the area left of the marked “Limit of Floodway”

Explanation of how to determine the risk to a specific property.

P. 16-19
Follow the steps indicated.

It should be noted that the FIRM provides the relative hazard due to

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flooding. The depth of flooding in the structure determines the exact risk to a specific property.

Verify Understanding

Ask:

9. How do you get a FIRM?
10. Is a FIRM free?
11. If you want flood hazard information for a large city or county, how many maps will you need? How can you find out?

Use actual FIRM materials.
In the back of the manual, get the FIRM Map Index from the second plastic pouch.

Discuss:

12. What is the date of the map's information?
13. What does the 6-digit number "370168" signify?
14. What do the numbers after that 6-digit number signify?
15. What number do you need for the map showing Routes 40 and 17, the Murrayville and Kings Grant Tributaries and Pages Creek?

Get the detailed FIRM map from the back of the manual.

16. What is its date?
17. Is flood insurance available for residents in this area?
18. Find Murrayville Road at the left edge (middle) of the map. If there are any homes on that road in the floodplain, are some at greater risk than others?
19. Find location 1 on the map. What is its hazard?
20. What about the hazard for location 2?
21. What is the hazard for location 3, in the upper middle section of the map, in Zone C, far from marked flood zones? Can you safely assume that site is safe from flooding?
22. What is the hazard for location 9? Because the surrounding areas are designated Zone A10, EL 11, can you assume

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location 9 is fairly safe because it is marked Zone C?

(To save time, omit questions 23-26.)

Discuss the relative hazards for other marked sites:

23. Location 5

24. Location 7

25. Location 8

26. Location 10

Ask for questions.

Respond to questions.

The National Flood Insurance Program Fact Sheet

The National Flood Insurance Program

Refer to the National Flood Insurance Program Fact Sheet at the front of the Appendix. It tells what the program is, its purpose, what it covers, types of coverage offered, how to buy it, and some myths and facts.

Discuss Wind Risk
Time: 10 min.

How to Determine Wind Risk from a Wind Zone Map

Wind damage comes from the high winds often generated by a tornado or hurricane. Most of the central and eastern sections of the United States have some tornado risk; however, in the West, the risk from tornadoes is low. Maps that show that the combined risks from both tornadoes and hurricanes put most of central and eastern United States at medium to high risk for wind damage.

Directions for Using a Wind Zone Map

Refer to the Wind Zone Map on page 2-15.

To determine wind risk to a particular area:

1. After locating your targeted area on the FEMA/Texas Tech University map, note its color and the significance of the color.
 - White – low risk area
 - Yellow – low medium risk area
 - Orange – medium high risk area
 - Brick – high risk area
2. Note the special markings noted in the Legend.
 - Hatching - a special wind region
 - Dots - a hurricane-susceptible region
3. Determine what mitigation measures are appropriate for the various levels of risk.
 - Low risk: the need for a high-wind shelter is a matter of preference.
 - Moderate risk: consider using a shelter for protection.
 - High risk: shelter is the preferred mitigation measure for protection.

For example:

- Detroit is in a brick area, so its risk is high. It is recommended that residents have a shelter for protection.

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Ask:

4. What effect does the hatching have on the orange section in western Virginia and North Carolina?

Verify Understanding

Ask:

5. What is the wind risk in Tulsa, OK?

Look on page 2-19 where you will find a Relative Risk Levels Table. Enter your answers to these questions.

6. What is the wind risk in Kansas City, MO?
7. What is the wind risk in Oakland, CA
8. What is the wind risk in Wilmington, NC?

Earthquake Risk
Time: 10 min.

How to Determine Earthquake Risk from an Earthquake Zone Map

When the ground shifts due to an earthquake, depending on the magnitude of the earthquake and the condition of buildings there may be damage to the contents of a home and its structure.

Directions for earthquake map

Look at the Earthquake Zone Map on page 2-16.

To determine earthquake risk to a particular area:

1. Find your targeted area on this US Geological Survey map, and note its color.
2. Consult the Legend to determine the risk level:
 - White and blue – low risk
 - Green, yellow and orange – moderate risk areas
 - Red – high risk areas
 - %g means percentage of gravity

The map depicts the peak ground acceleration that has a 10% chance of being exceeded in the next 50 years. This is a general map that provides an indication of risk. Local soil conditions may amplify an earthquake's intensity. If earthquake is your highest hazard, it is recommended that you use local maps when they are available.

Note: Peak ground acceleration is often applied in the development of building codes, and this map was created in part as a tool for land use planning and building design in areas subject to earthquake hazards.

For example:

The green and yellow indicate the earthquake risk in western Virginia and NC is medium. How to pinpoint the risk more precisely than on this map is explained below.

Verify Understanding

Exercise: Determine Earthquake Risk in a Selected Area

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3. What is the earthquake risk in Tulsa, OK?
4. What is the earthquake risk in Kansas City, MO?
5. What is the earthquake risk in Oakland/San Francisco, CA?
6. What is the earthquake risk in Wilmington, NC?

Use a detailed map of Wilmington, NC with directions.

Look on page 2-17 for a detailed earthquake zone map of the Wilmington, NC area. This very precise Legend shows the Wilmington area in blue, which corresponds to 3, a low relative risk.

Ask for questions

Respond to questions.

Time: 5 min.

How to Determine Fire Risk in a Selected Area

Look at the Fire Zones Map on page 2-18. Local weather conditions will affect the immediate risk of wildfire. The map describes the general or typical fire risk experienced by areas of the country by month.

The colors indicate:

- Red – the highest risk
- Orange - high medium risk
- Yellow - low medium risk (assume half the risk of orange)
- Green - low risk

To simplify using the map, because orange is the predominant color, use the number of months for which risk is marked as an indicator of relative risk:

- 1-4 – low risk
- 5-8 – medium risk
- 9-12 – high risk

Verify Understanding

1. What is the fire risk in Tulsa, OK?
2. What is the fire risk in Kansas City, MO?
3. What is the fire risk in Oakland/San Francisco, CA?
4. What is the fire risk in Wilmington, NC?

Encourage additional questions and respond to them.

Summary of Learning: Unit 2

Time: 1 min.

This unit discussed:

- The need to recognize selected natural hazards so homeowners:
 - Become aware of their risks
 - Will welcome the opportunity to implement mitigation measures to protect their own lives and property as well as others'
- For particular areas of the country, how to assess the relative risks of selected natural hazards:
 - Flood, the most costly hazard in the United States
 - Wind
 - Earthquake
 - Fire
- To assess flood hazard, FEMA provides Flood Rate Insurance Maps (FIRMs) for many localities. Also, the National Flood Insurance Program (NFIP) provides low cost flood insurance via private insurance companies to homeowners to speed their recovery from damage.
- To assess wind risk, you can consult a map showing wind risk zones such as one consistent with ASCE 7-98.
- To assess earthquake risk, national and detailed maps for specific areas are available from USGS and may be available locally.
- Information about fire risk is available from the National Wildland/Urban Interface Fire Protection Program and the US Department of Agriculture Forest Service.

Prepare for Unit 3

Time: 1 min.

After determining which hazards have greatest risk for your area, you need to focus on identifying the specific risks for each home and their appropriate mitigation measures.

Unit 3 has information about the dangers and pictures of the terrible consequences of the four selected natural disasters. It also explains what mitigation measures for the identified hazards can be applied to homes.

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Fact Sheets
Time: 1 min.

Mitigation measures are explained on Fact Sheets for each of the four selected natural disasters. Each Fact Sheet focuses on one mitigation measure. It shows:

- A picture of the catastrophic damages that can result from failure to recognize and take appropriate action against that specific risk.
- A picture of the existing risk
- A picture or diagram of the mitigation measure properly applied

These Fact Sheets may be shown or given to a homeowner to assist you in explaining the problem in that home as well as how the proposed mitigation measure might look when it is installed.

Action Checklist

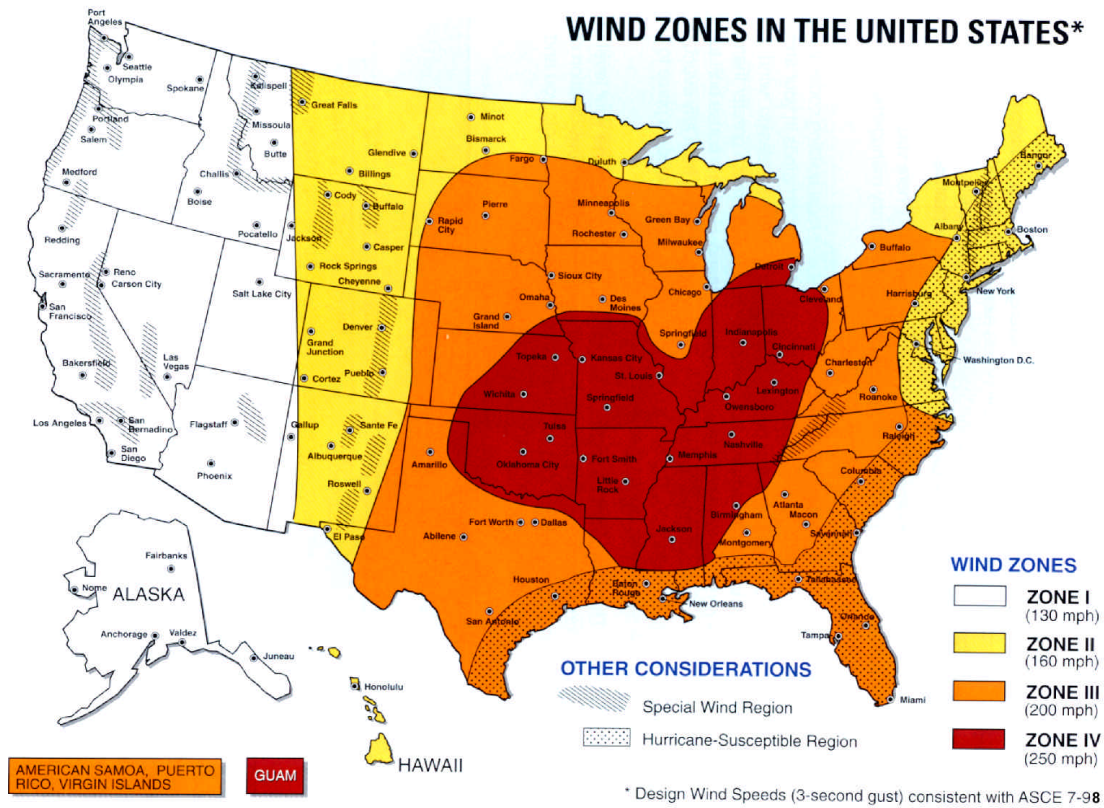
In Unit 3 you will also use a one page Action Checklist. It lists all the mitigation measures in approximately the same order as you need them – exterior, then interior, from the top to the bottom of the home. You can use it during the inspection to check all of the mitigation measures that apply to the home. Then you will consider which are the most beneficial ones to implement.

Questions

Respond to questions.

Unit 2: Identify the Hazards

Map of Wind Zones



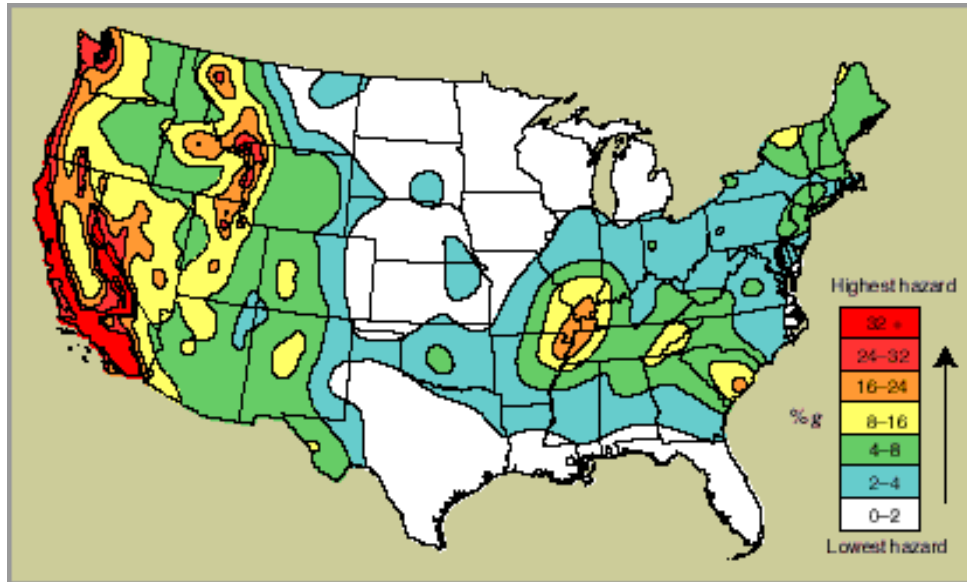
Unit 2: Identify the Hazards

National Map of Earthquake Zones

Note: Map taken from USGS website

National Seismic Hazard Mapping Project, August 2000.

<http://geohazards.cr.usgs.gov/eq/>



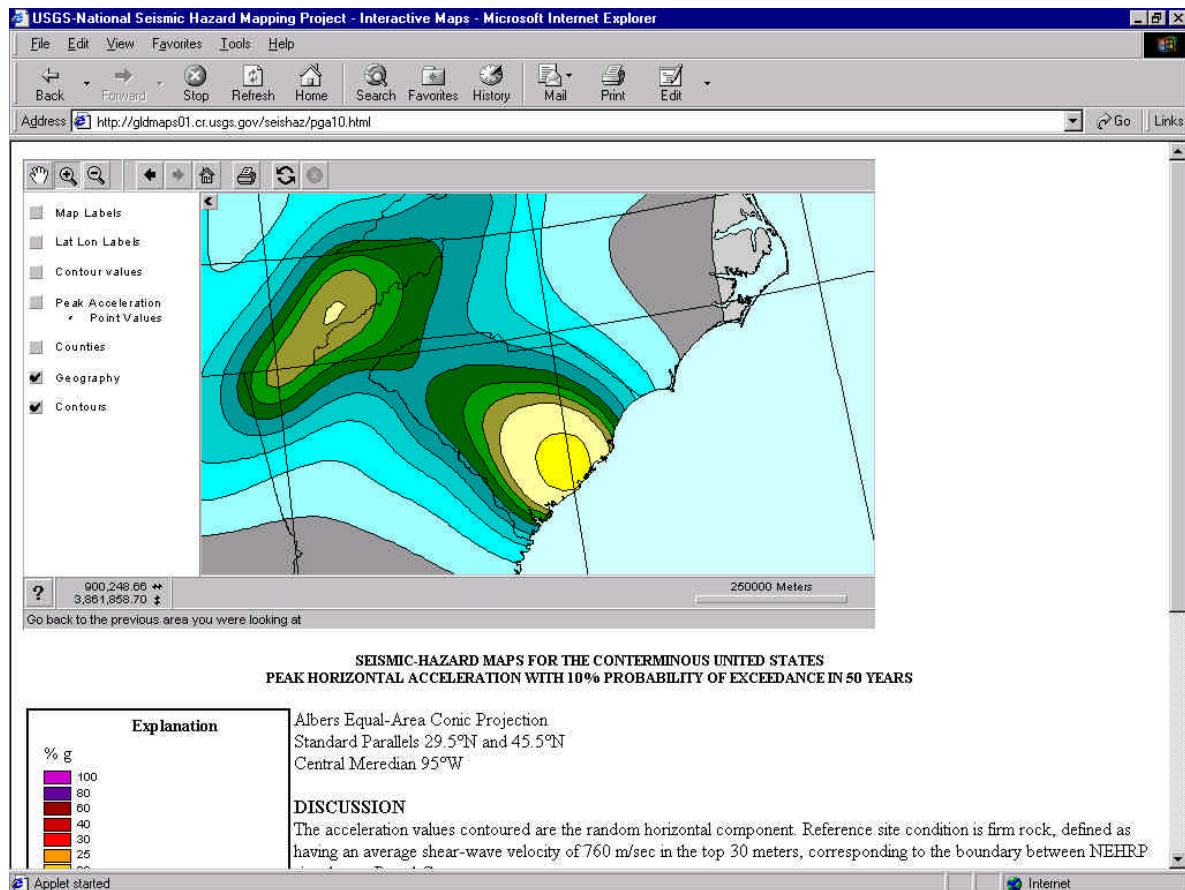
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Detailed Map of Earthquake Zones: Wilmington, NC

Note: Map taken from USGS website

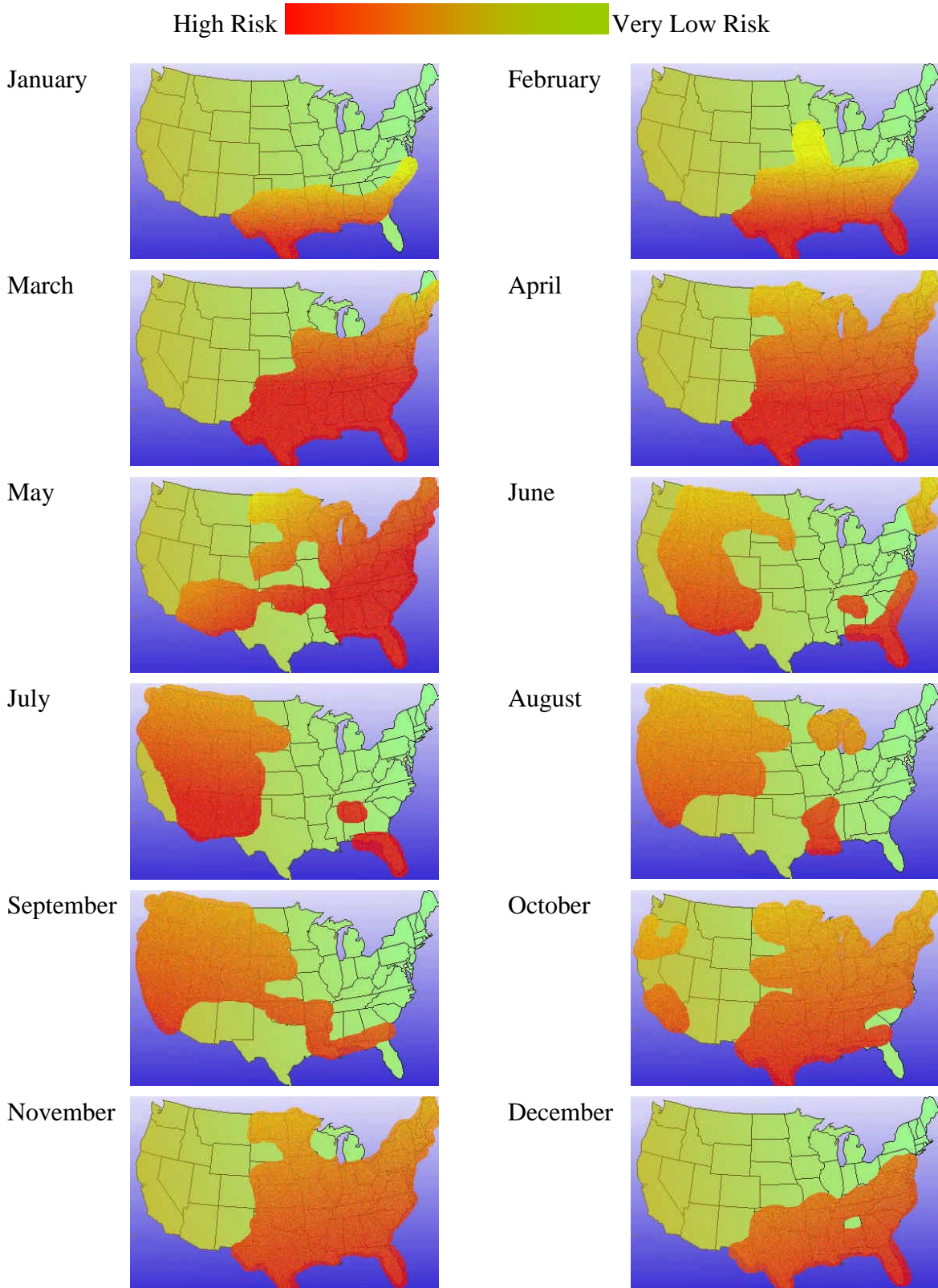
National Seismic Hazard Mapping Project, August 2000.

<http://gldmaps01.cr.usgs.gov/seishaz/pga10.html>



Unit 2: Identify the Hazards

Map of Fire Risk



Unit 2: Identify the Hazards

Relative Risk Levels from Selected Natural Disasters				
	Tulsa, OK	Kansas City, MO	San Francisco Oakland, CA	Wilmington, NC
Risk from:				
Flood*	Low	High	Low	Medium
Wind				
Earthquake				
Fire				

* Since the risk due to flooding varies from structure to structure and is determined by the depth of flooding in the structure, this information has been provided.